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LIFE SPANS OF FACILITY EQUIPMENT

WHITE PAPER #4

Nothing lasts forever.

It's good to stay ahead of the wave.

When it comes to buildings and equipment, the best approach is to plan for it….stay ahead of the wave. Here are some typical life spans of energy consuming equipment to help you plan. Setting aside a few percent per year of the building cost is usually sufficient to sustain the building systems.

This information may also be helpful if you plan to purchase an existing building and don't want surprises.

Side comment for replacements with energy benefits

Equipment life tables are used for general planning so large replacements are not a surprise. They are also used for project financial evaluation like net present value and comparing options, including justifying equipment options that cost more in exchange for lower utility cost or other benefit.

Standard practice for financial evaluation acknowledges replacement at end of life as 'normal replacement' - needed regardless of options available to the new one. Car's worn out, need a new car.

The normal replacement concept separates basic like kind replacement (because the car is worn out) from the optional features. With this in mind, energy efficiency upgrades would be based on the additional savings (plus any discarded useful life if replacing early) vs. the additional cost. Asking energy savings to pay for work needed anyway just makes payback times look a lot longer than they really are.

Table 1: Service Life of Various System Components

Notes

- Your mileage may vary. Factors affecting actual life include run-hours, maintenance, and durability of manufacture
- The figures given are when it becomes reasonable to scrap the equipment due to excessive, escalating, and mounting repair costs. At this point, even though equipment life can be extended, most people will buy a new one. This does not mean there are no repairs along the way. For example, it is almost certain that an air conditioner or heat pump will get several repairs including a new compressor during the advertised 'life'.

Sources:

1. ASHRAE Applications Handbook, 2003
2. Iowa Department of Natural Resources, 2002, "Life Cycle Cost Analysis Guidelines – 2002"
3. "Service Life of Energy Conservation Measures" Bonneville power Administration (July 14, 1987)
4. Stoffer Inspections, L.C. Home Page, "Life Cycles and Approximate Costs to Repair/Replace/Upgrade", 2004 (home inspector)
5. Jeffrey D. Spitler, C.M. Leonard Professor, Oklahoma State University, Current and Recent Research Simulation of Ground Source Heat Pump Systems, 2001Faculty/spitler/current_research.html
6. Manufacturer's Literature
7. Author experience
8. Author estimate

Equipment	Normal Expected Replacement Life	Source
Hot Water Boiler	25 years	1
Steam Boiler	30 years	1
Steam Traps	7 years	3
Conventional Direct Gas-Fired Tank-Type Domestic Water Heater	8-12 years	4
Heat Pump Water Heater	10 years	3
Solar Water Heater	15 years	3
Centrifugal Chillers	23 years	1
Reciprocating Chiller	12-14 years	2
Screw Chiller	20 years	3
Galvanized Cooling Towers	20 years	1
Package Rooftop A/C Unit	15 years	1
Water Cooled Package Unit	15 years	1
Split System A/C	15 years	1
Fan Coil	20 years	2
VAV Boxes	20 years	1
Hot Water Unit Heaters	20 years	1
Electric Unit Heaters	13	1
PTAC (Packaged Terminal Air Conditioner)	10-15 years	2,1
Computer Room Air Conditioner	10-15 years	2,3
Gas Furnace	18 years	1
Gas Fired Radiant Tube Heater	10 years	3
Air Source Heat Pump	15 years	1

Equipment	Normal Expected Replacement Life	Source
Water Source or Ground Source Heat Pump (closed loop)	19 years	1
Ground Source Heat Pump Bore Field (pipe life is 50 years. System life is limited by the grout and the heat transfer interface to the earth)	30 years	5
Indoor Air Handler	20-25 years	2
Air-Side Economizers	10 years	3
Water-Side Economizers	11 years	3
Electric Baseboard Heat	10-15 years	4
Electric Duct Heater	15 years	1
Hot Water Baseboard Heat	25 years	1
Base Mounted Pump	20 years	1
Sump Pump	10 years	1
Utility Fans	20 years	2
Ductwork (metal)	30 years	1
Air Curtain	10 years	3
Polyethylene Strip Curtain	3 years	3
Kitchen Exhaust Hood Make-Up Air Tempering Unit	10 years	3
Shell and Tube Heat Exchanger	24 years	1
Heat Pipe Heat Recovery	14 years	3
Rotary Wheel Heat Recovery	11 years	3
Heat Recovery from Refrigeration Condensers	11 years	3
Thermal Energy Storage System (TES) - Ice	19 years	3
Thermal Energy Storage System (TES) - Water	20 years	3
Direct Evaporative Cooling	7-10 years	8
Evaporative Pre-Cooling	8-12 years	8
Indirect-Direct Evaporative Cooling	15-20 years	8
Evaporative Cooling Cellulose Media	5 years	6
Evaporative Cooling Felt Pads	2 years	6
Air Washer	17 years	1
Motors	15-17 years	3
VFD	15 years	3
Motor Starter	17 years	3
Air Compressor	20	2
Lighting Fixture	20 years	3
Ballast – all types	12 years	3
Motion Sensor	10 years	3
Dimming Systems	20	3
Double Pane Windows	12-20 years	6
Solar Shade Film	7-10 years	3
Molded Insulation	20 years	1
Blanket Insulation	24 years	1
Control Valves	20 years	1

Equipment	Normal Expected Replacement Life	Source
Dampers	20 years	1
Valve/Damper Actuator - pneumatic	20 years	1
Valve/Damper Actuator – hydraulic	15 years	1
Valve/Damper Actuator – mini hydraulic (for terminal units)	5 years	7
Valve/Damper Actuator – electric – oil filled	10-15 years	7
Valve/Damper Actuator – electric – open air	5-7 years	7
Valve/Damper Actuator – self-contained (system powered)	10 years	1
Valve/Damper Actuator – Residential style “clock motor” terminal valves	5 years	7
“Active” control sensors and transmitters (powered-type)	5 years	7
Pneumatic Controls – General	20 years	1
Analog Electronic Controls - General	7-10 years	7
DDC Controls (before made obsolete by technology advances)	7-10 years	7